Clean Vehicle Education Foundation

Modifications of Maintenance Facilities for NGVs

Wisconsin Natural Gas Vehicle Fuel Roundtable

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John Dimmick – Director of Technology

CVEF

- A non-profit foundation working primarily in NGVs but with some Fuel Cell vehicle work
- Education of consumers, regulators and stakeholders particularly on safety concerns.
- Extensive support for Codes & Standards for NGVs and FCVs on ANSI and NFPA standards.
- Provides technical support for incident investigation and root cause and to publish necessary safety bulletins.
- Propose revisions for safety standards to prevent recurrence of failures.
- Initiates action on technical issues such a diesel gallon equivalents and roof-mounted cylinders on interstates.

CVEF cont'd

- CVEF is a resource for specific technical questions and can often refer inquiries to competent experts if they are outside our in-house expertise.
- Recent documents added to website www.cleanvehicle.org
  - Guidelines for Maintenance Facility Modifications
  - Advice for CNG Vehicle Owners After Accidents
  - Safety advice for defueling CNG vehicles and decommissioning/Disposal of Cylinders
  - Convert you Vehicle to CNG Safely
  - Fatal Accident Removing Cylinder Solenoid Valve

Guideline for Determining the Modifications Required for Adding Compressed Natural Gas and Liquefied Natural Gas Vehicles to Existing Maintenance Facilities

- Prepared by Douglas B. Horne, PE President of CVEF and member of NFPA 30A and NFPA 52
- Available for download at www.cleanvehicle.org.
- Relevant national codes:
  - International Fire Code (IFC 2012)
  - International Mechanical Code (IMC 2012)
  - International Building Code (IBC 2012)
  - NFPA 30A (2012) Code for Motor Fuel Dispensing Facilities and Repair Garages
  - NFPA 52 (2010)Vehicular Gaseous Fuel Systems Code
  - NFPA 88A (2007) Standards for Parking Structures

Key facility Questions

- Is the facility used for only minor repairs or is it used for major repairs or repairs to the natural gas fuel system? Special requirements apply if:
  - Fuel system work is performed or welding or open flames are used (IFC 2211.7)
  - Work includes engine overhauls, painting, body and fender work and any repairs draining the fuel tanks.
- If the facility is not limited to minor repairs, it is recommended that an experienced professional engineer be contracted to evaluate necessary changes and work with the AHJ (Authority Having Jurisdiction).
- Does a non-exempt facility serve conventional liquid fueled vehicles? If it does, NFPA 30 applies.
- Does the facility meet current ventilation requirements? If not, it should be upgraded.
- See the Flow Chart for Modification Analysis in the CVEF guideline for an organized approach to decisions.

Modified Threats

- Facility requirements were originally based on a failure scenario in which the pressure relief device on a vehicle fuel container activated without a fire.
  - This was a failure mode seen several times on vehicles whose PRDs were manufactured prior to the development of ANSI PRD1.
  - It was assumed that a quantity of gas equal to 1.5 times the capacity of the cylinder could be released by a PRD failure.
  - PRD1 was developed specifically to address durability and reliability issues in CNG vehicle service.
  - PRD1 has been successful in preventing failures by unintended activation of PRDs and older pre-PRD1 PRDs have aged out of use due to cylinder expiration dates.
  - CVEF is working to obtain a new CFD analysis to support reduced ventilation requirements.

Critical Safety Issue
CNG Defueling

- NFPA 52 requires that facilities for venting of CNG must be approved by the AHJ and some minimum requirements are established.
- Unsafe Venting of CNG has been the cause of numerous accidents involving property damage, serious injury and loss of life.
- Facility managers should assure that CNG venting is performed only using an approved facility and the vehicle or valve manufacturer's instructions.